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INFORMATION REPORT INFORMATION REPORT

CENTRAL INTELLIGENCE AGENCY

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COUNTRY USSR

REPORT

SUBJECT Manual on the Soviet KP-28 Oxygen Respirator

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THIS IS UNEVALUATED INFORMATION. SOURCE GRADINGS ARE DEFINITIVE. APPRAISAL OF CONTENT IS TENTATIVE.

1. English-language Soviet manual entitled KP-28 Respirator: Operation and Installation Instruction The manual contains 27 pages and three diagrams of the equipment. The text covers use, technical specifications, parts, operating and installation instructions, routine checking, possible failures, calculation of oxygen reserve, and a guarantee. No date or publishing data appear on the document.

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2. When removed from the covering report, the document may be classified CONFIDENTIAL.

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MI - 26 OXYGEN RESPIRATOR
OPERATION AND INSTALLATION
INSTRUCTION

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I. DESTINATION OF TYPE KI-28

OXYGEN RESPIRATOR

The type KI-28 Oxygen Respirator is a stationary device designed for personal usage and is intended to supply oxygen to the flight personnel.

Its service will be:

1/ Continuous--at flights in the airtight cockpit at altitudes up to 15 km.

2/ Continuous-- at flights in the unsealed cockpit at altitudes up to 12 km.

3/ Short-time--at unsealing of the aircraft cockpit at altitudes ranging between 12 and 15 km /at the altitude of 15 km the time to stay after unsealing comprises 5 or 6 min/.

4/ Short-time--at leaving the aircraft by the airmen with a parachute, at altitudes up to 15 km.

The type KI-28 respirator belongs to the group of oxygen respirators working with surplus pressure, of the combined action type, i.e.:

1/ Up to the height of 11 or 13 km the respirator operates as a breathing automatic device;

2/ at higher altitudes a continuous supply of oxygen is cut in.

At heights ranging between 4 and 8 km /not obligatory/ and at those ranging between 8 and 15 km /obligatory/ there is maintained in the mask surplus pressure created by the respirator, which prevents air suction from the atmosphere

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when the mask happens [illegible] continuously, its hood [illegible]
other possible effects of [illegible].

Besides, [illegible] in the neighborhood of [illegible]
watery, i.e. with the [illegible] to the [illegible]
to the heart or [illegible] variable pressure [illegible]
secures the [illegible] partial pressure of oxygen
[illegible] the lungs on account of a continuous supply [illegible]
[illegible] cut in.

II. [illegible] OF DIVISION OF [illegible]-38

[illegible] EXPIRATION

1. Type - stationary, a combined action with [illegible]
   [illegible]
2. Model - [illegible]-38
3. Range of use - up to 15 km altitude.
4. Respirator resistance to inhalation at the outlet
   at lung ventilation of 30 l/min:
   at temperature of +20°C and +50°C . . . . . .
   not higher than 25 mm H2O.
   at temperature of -50°C. . not higher than 40 [illegible]
   Oxygen pressure in the bottle:
   [illegible] . . . . . 150 kg/cm²
   [illegible] . . . . . 30 kg/cm²
   Working pressure supplied to the respirator
   [illegible] at a consumption of 1000 l/min./ [illegible]
   - 3 reducer--8±1 kg/cm²

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when the mask happens not to hermetically fit and also in other possible events of non-airtightness.

Besides, beginning with the height of 11 km /not obligatory/, i.e. with the height of 13 km /obligatory/ and up to the height of 15 km the surplus pressure in the mask secures the required partial pressure of oxygen maintained in the lungs on account of a continuous supply of oxygen being cut in.

II. TECHNICAL SPECIFICATION OF KI-28

OXYGEN RESPIRATOR

1. Type - stationary, of combined action with surplus pressure
2. Model - KI-28
3. Range of use - up to 15 km altitude.
4. Respirator resistance to inhalation at the outlet at lung ventilation of 30 l/min:

at a temperature of +20°C and +50°C . . . . . not higher than 25 mm WG.

at a temperature of -50°C. . not higher than 40mm WG.

5. Oxygen pressure in the bottle:

maximum . . . . . 150 kg/cm^2

minimum . . . . . 30 kg/cm^2

Working pressure supplied to the respirator /pressure at a consumption of 10±2 l/min./ through DP-7B reducer--8±1 kg/cm^2

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7. Oxygen content in the inhaled gas mixture as per altitudes at a lung ventilation of 7.5 l/min /15 inhalations by 0.5 litre/ or at a constant flow of 20 l/min.

Altitude in km.	4	7.5	8.5
Percentage of oxygen	35 to 55	55 to 92	30 and higher

8. Additional oxygen supply by the respirator at per altitudes with the mask removed.

Altitude in km	3	4	8	10	12	Temperature
Oxygen supply in l/min	-	0	Not less than 4	5	8	+20°C
	0	-	not less than 4	5	8	-50°C

9. Suprlus pressure value within the mask at altitudes:

4 km . . . . . 0 mm W.C.

9 to 10 km. . . . . not exceeding 40 mm W.G.

13 km. . . . . 65 to 190 mm WC: interval

14 km. . . . . 135 to 280 mm WC: and

15 km. . . . . 270 to 360 mm WC: inhalation

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10. Altitude at which the continuous oxygen supply is cut in: beginning with 11 to 13 km.

11. Altitude at which the continuous oxygen supply is cut off - not less than 8 km.

12. Value of continuous oxygen supply by the respir[illegible] at altitudes of 11 to 13 and up to 15 km [illegible]

13. Pressure of the respirator safety valve opening at consumptions of 3 and 20 l/min-450 to 750mm [illegible].

14. Respirator overall dimensions in mm- 230 x 170 x[illegible]

15. Weight of respirator in g --not over 1750.

III. SUPPLY LIST

Type KI-28 oxygen respirator /Fig.1/ set comprises:

1. KI-28 oxygen respirator	-	1 piece
2. KP-28 oxygen reducer	-	1 do
3. KM-18N oxygen mask	-	1 do
4. KK-18 oxygen indicator	-	1 do
5. KI-10 hose	-	1 do
6. KAB-14 oxygen board accessories		1 set

Note: The piping length, the bottle capacity, and the mounting board design is selected depending on the aircraft design. The number of details of the KAB-14 board accessories and the length of KI-10 hose is determined by the erection diagram of the aircraft.

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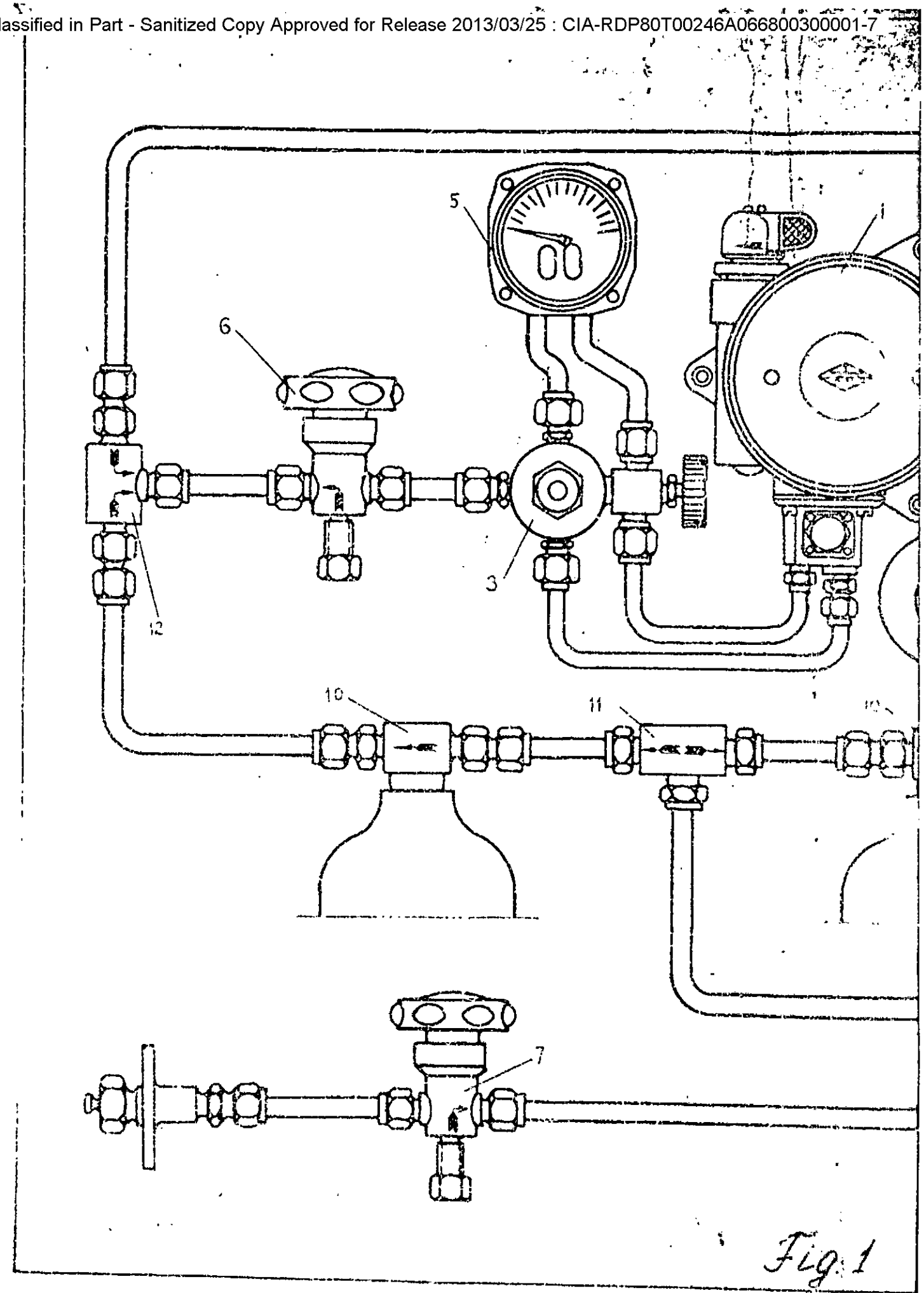

Fig. 1

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7. Oxygen content in the inhaled gas mixture as per altitudes at a lung ventilation of 7.5 l/min /15 inhalations by 0.5 litre/ or at a constant flow of 20 l/min.

Altitude in km.	4	7.5	8.5
Percentage of oxygen	35 to 55	55 to 92	30 and [illegible]

8. Additional oxygen supply by the respirator as per altitudes with the mask removed.

Altitude in km	3	4	8	10	12	Temperature
Oxygen supply in l/min	-	0	Not less than 4 6 8			+20°C
	0	-	not less than 4 6 8			-50°C

9. Suprlus pressure value within the mask at altitud,

4 km 0 mm W.G.

[illegible] to 10 [illegible] . . . . . not exceeding 40 mm W.G.

[illegible] km. . . . . 65 to 190 mm WG: interval

. . . . . 135 to 280 mm WG: and

. . . . . 270 to 360 mm WG: inhalation

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10. Altitude at which the continuous oxygen supply is cut into beginning with 11 to 13 km.

11. Altitude at which the continuous oxygen supply is cut off - not less than 8 km.

12. Value of continuous oxygen supply by the respirator at altitudes of 11 to 13 and up to 15 km - 15 to 20 l/min.

13. Pressure of the respirator safety valve opening at consumptions of 3 and 20 l/min-450 to 750mm HG.

14. Respirator overall dimensions in mm- 230 x 170 x120

15. Weight of respirator in g --not over 1750.

III. SUPPLY LIST

Type KI-28 oxygen respirator /Fig.1/ set comprises:

1. KI-28 oxygen respirator	-	1 piece
2. RP-28 oxygen reducer	-	1 do
3. MM-18E oxygen mask	-	1 do
4. MK-18 oxygen indicator	-	1 do
5. KM-10 hose	-	1 do
6. KAB-14 oxygen board accessories		1 set

Note: The piping length, the bottle capacity, and the mounting board design is selected depending on the aircraft design. The number of details of the KAB-14 board accessories and the length of KM-10 hose is determined by the erection diagram of the aircraft.

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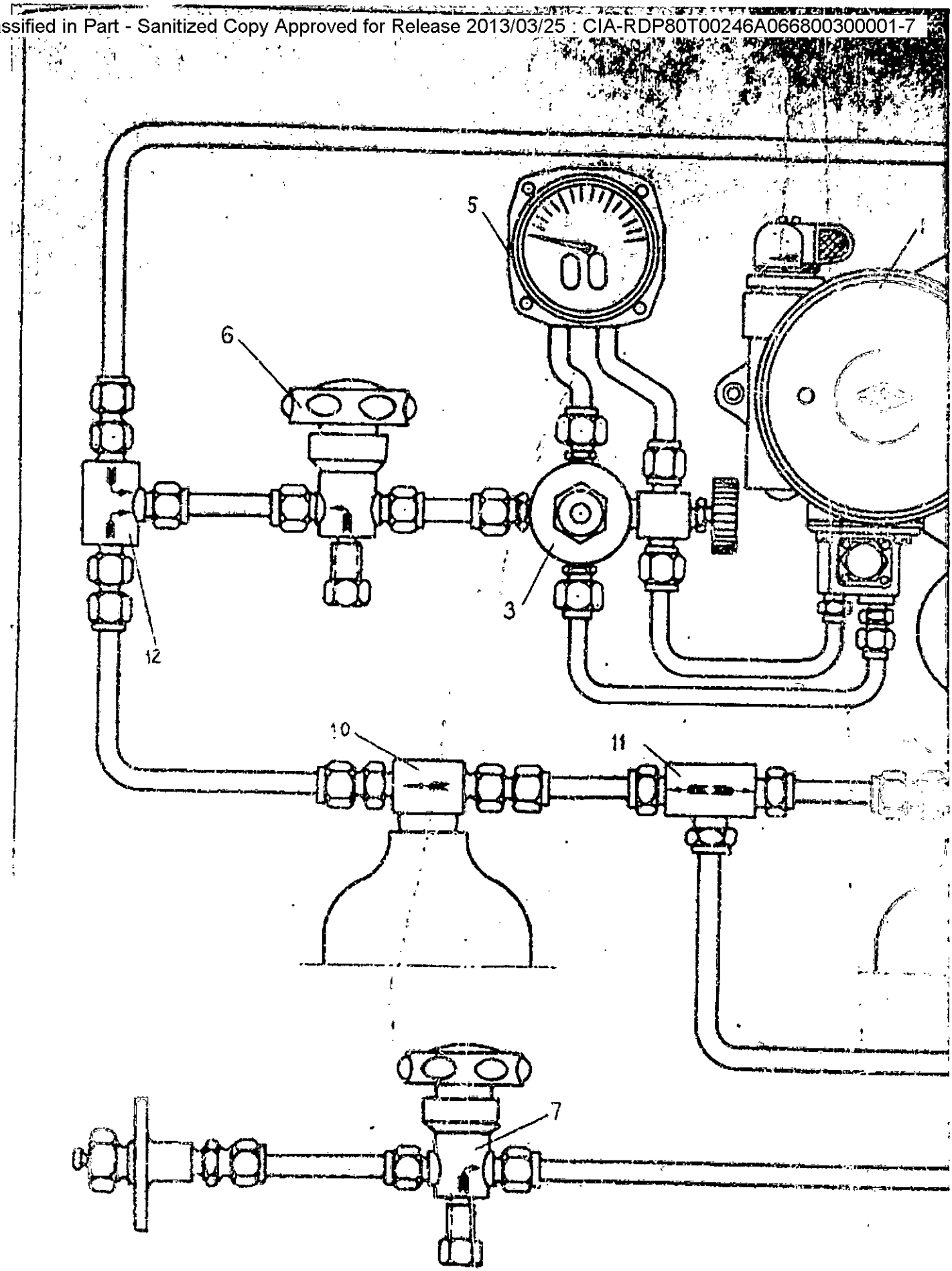

Fig. 1

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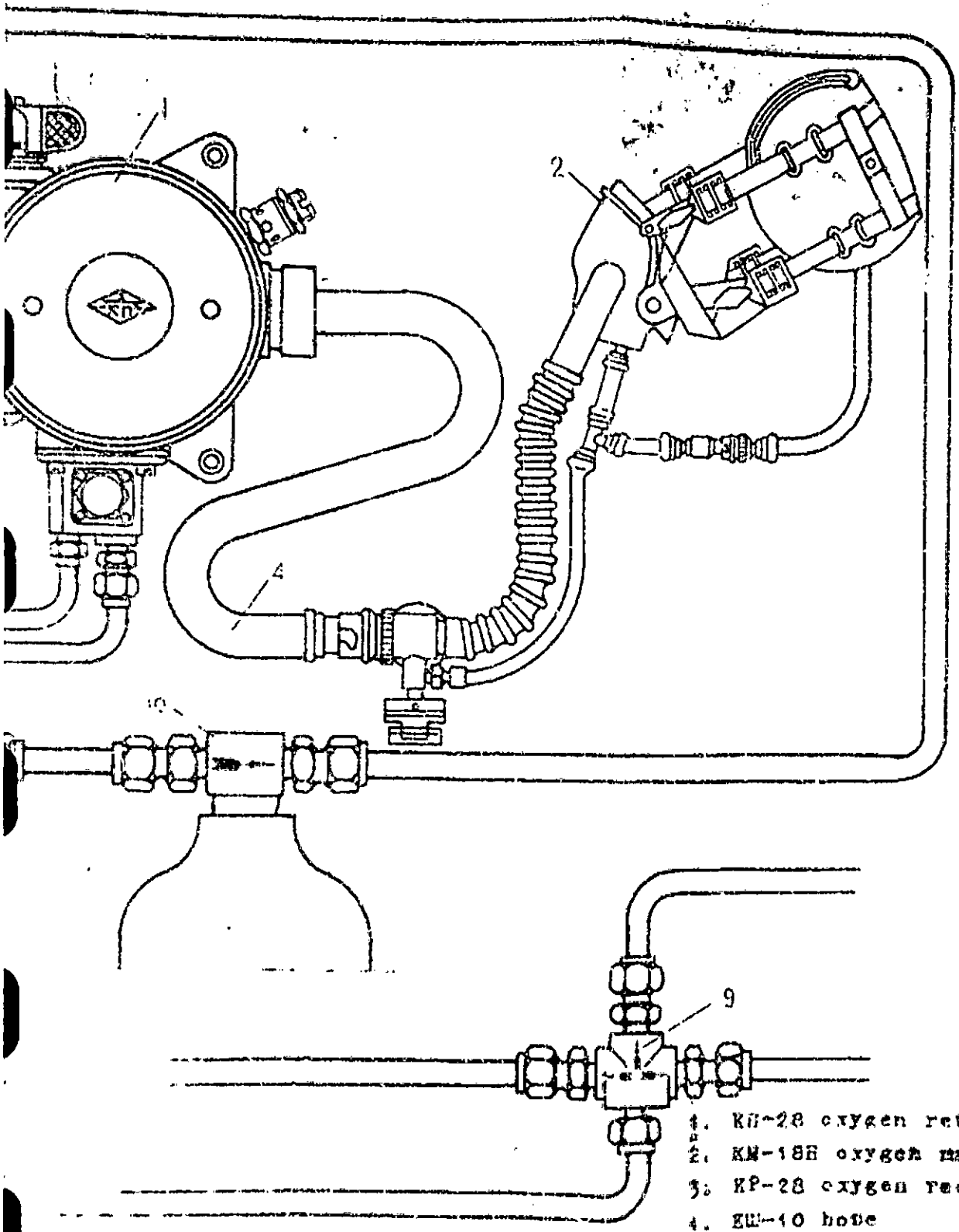

1. KM-28 oxygen respirator
2. KM-18E oxygen mask.
3. KP-28 oxygen reducer
4. EM-10 hose
5. MK-18 oxygen indicator
6; 7; 8; 9; 10; 11; 12; KA5-1 oxygen board accessories.

Fig. 1

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IV. OPERATION OF THE KI-28 OXYGEN RESPIRATOR UNIT

The type KI-28 oxygen respirator proper comprises the following main assemblies /Fig.2/:

I - body; II - two covers; III - two membranes; IV - breathing automatic device complete with ejector and mechanism for continuous oxygen supply; V - air suction automatic device; VI - air suction automatic device switch; VII - surplus pressure mechanism; VIII - surplus pressure hand control; and IX - safety valve.

A. Respirator Unit Operation at Altitudes up to 11 - 13 km

The elementary diagram of the KI-28 respirator Unit operation is shown in Fig.3.

At inhalation by the lung, in the mask, hose, and respirator body there is created a vacuum. Under the effect of the differential pressure inside and outside of the respirator body the membranes 1 are being bent inward the respirator to press on levers 2 of the breathing automatic device, forcing them to turn around the axles 3. Small shoulders of the levers 2 come to press against the rest 4 of the movable rod 5, move the latter, and also valve 7 connected to it through the draft 6, along the axle away from saddle opening access to the oxygen from the H.P. space into the L.P. space of the breathing automatic device body. From the L.P. space of the breathing automatic device body the oxygen flows in two directions:

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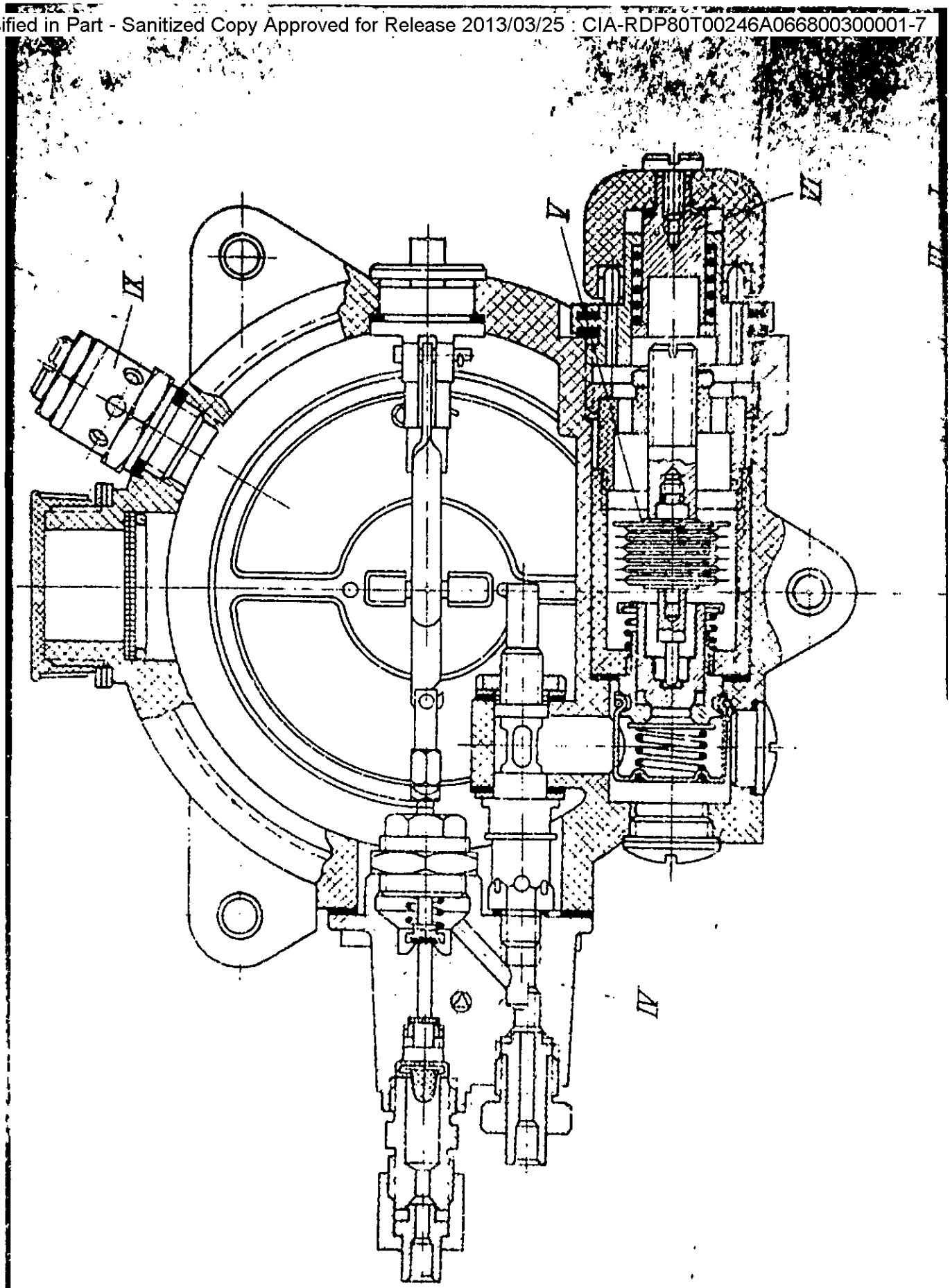

Fig. 2

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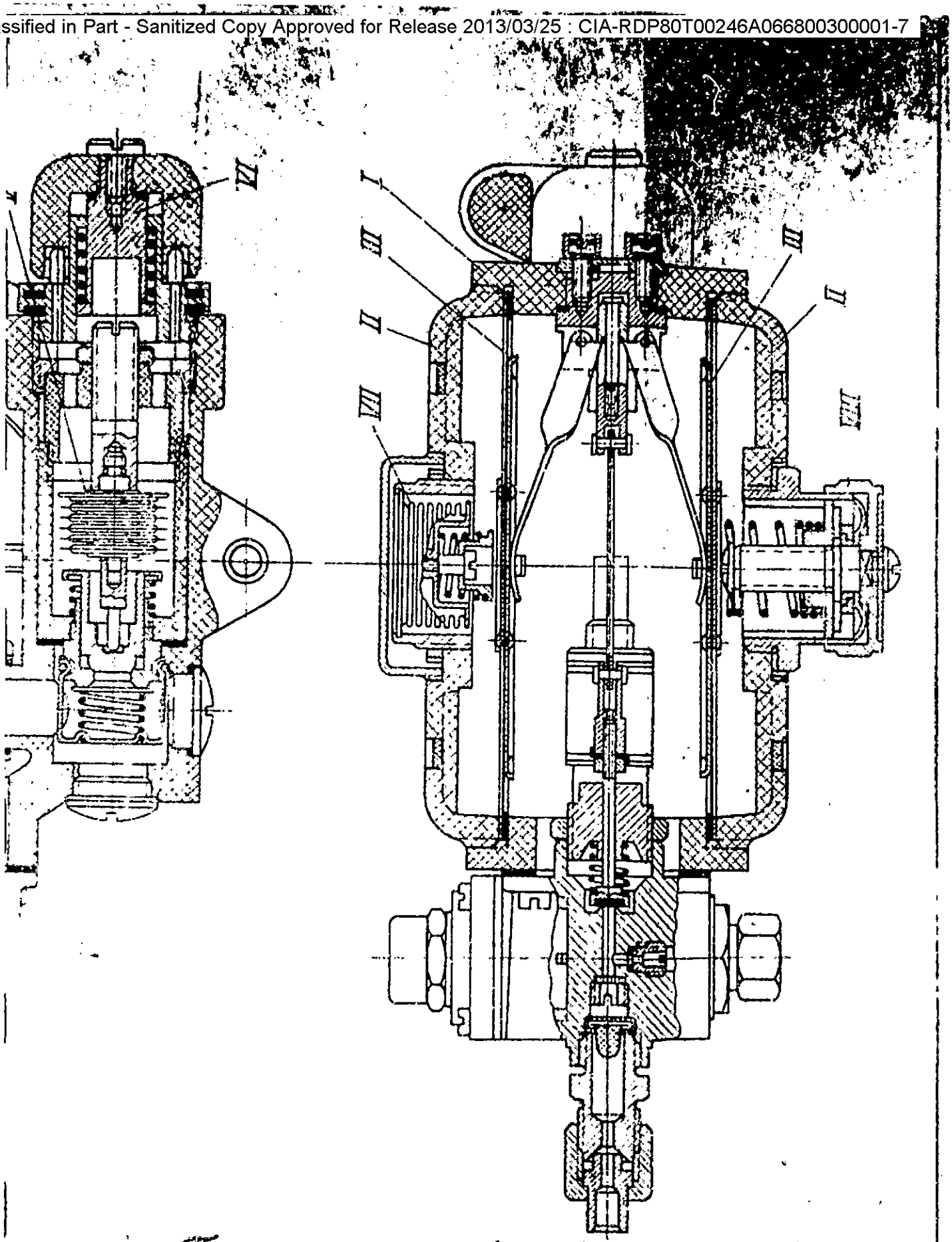

Fig. 2

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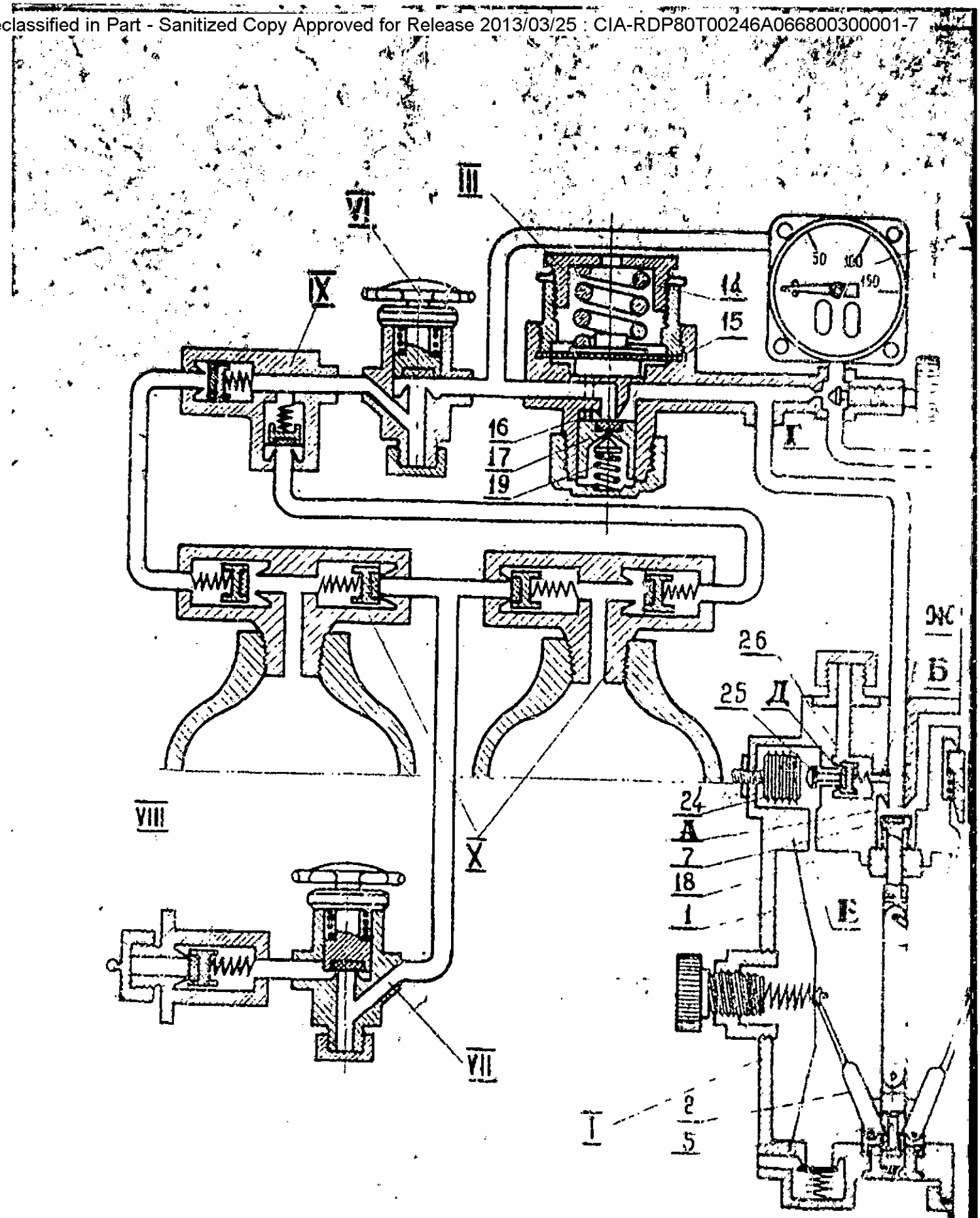

Fig. 3

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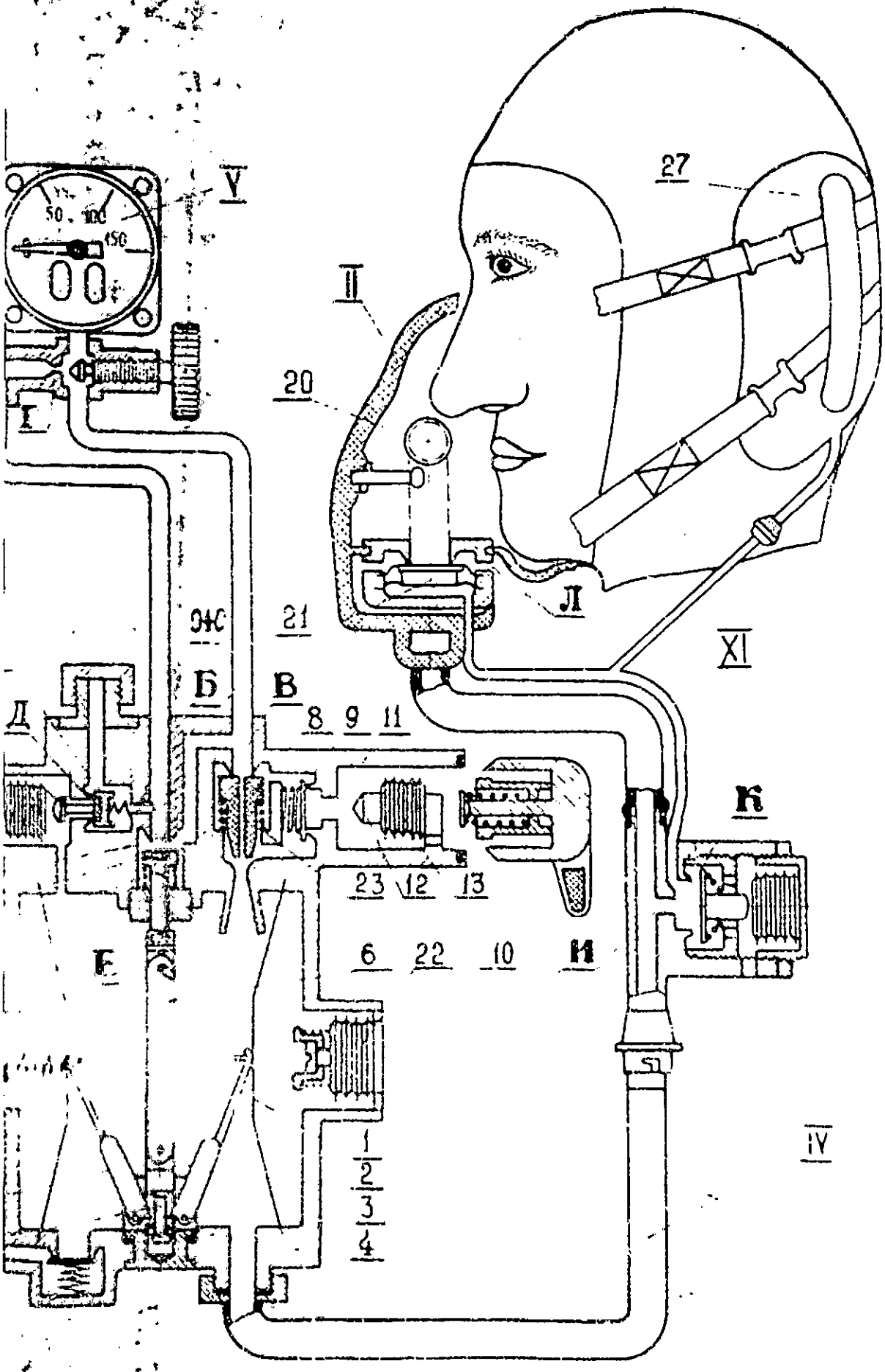

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along canal 8 into the oxygen indicator chamber where, under the oxygen pressure, the membrane bends and presses by the levers, upon the flags. The flags separate, opening the indicator ports and signalling in this way oxygen access to the respirator;

2/ Via the canal 8 and into the ejector nozzle 3. Oxygen flowing at a great speed through the ejector nozzle 3 carries away the air, creating vacuum in the space between ejector and the check valve 9 of the air suction automatic device. Under the effect of the differential pressure the check valve 9 opens and the air from the atmosphere enters the ejector passing through the suction switch 10 and the air suction automatic device 11. In the ejector it is being mixed with oxygen and is carried away with the latter to reach the respirator body.

The amount of air sucked from the atmosphere will be determined by the degree of opening of the air suction automatic device valve 12, the degree of opening of valve 12 being controlled by aneroid 13 in dependence upon the height of flight. The flight height increasing the aneroid 13 while its [illegible] gradually closes the valve 12. At the height of [illegible] valve 12 is fully closed and the air suction from the atmosphere is discontinued. From this moment only pure oxygen is supplied for inhalation.

Simultaneously, with the GI-2B respirator is started the operation of the PP-2b reducer. At inhalation, due to oxygen consumption through the respirator, the pressure in the reducer L.P. chamber is being lowered. The main spring

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14 forces the membrane 15 to bend and by pushers 16 moves the valve 17 from the saddle, thus providing access to the oxygen from the reducer H.P. chamber into the L.P. chamber and through the piping to the KM-28 respirator.

Inhalation discontinued and exhalation taking place, the pressure within the respirator body becomes equal to the atmospheric pressure and, therefore, differential pressure is not acting any longer on memoranes 1. The levers 2 are being freed and the valve 7, under the action of the spring 18, closes the saddle A, thus shutting off oxygen access to the respirator. At the same moment, oxygen consumption by the respirator discontinuing the pressure at the respirator inlet and in the reducer L.P. chamber increases up to the value of 12 kg/cm^2 /not more/.

The membrane 15, under the action of this pressure, bends, overcoming the resistance of the main spring 14.. Under the pressure of the counter - spring 19 the valve 17 [illegible] off the oxygen access from the bottle to the reducer. [illegible] closing of the valve 7 of the breathing automatic device [illegible] pressure upon the oxygen indicator membrane is lowered. Therefore, under the action of the spring, the indicator [illegible] set and close the scale openings signalling cessation oxygen supply to the respirator.

[illegible] exhalation, the mask inhalation valves 20 are closed [illegible] exhaled gas mixture passes through exhalation valve [illegible] exhalation, the oxygen flow through ejector nozzle 8 [illegible] continued and, therefore, air suction from the atmosphere [illegible] air suction automatic device 11 is shut [illegible] valve.

At altitudes ranging from 4 to 5 km the surplus pres-

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sure mechanism 22 comes into action, creating in the respirator a pressure of up to 40 mm W.G.

When there is surplus pressure in the respirator and the mask fits hermetically operation of the respirator unit is similar to the operation taking place when there is no surplus pressure, the only difference being in that in the first case resistance to inhalation is smaller.

When the mask does not fit hermetically there will take place oxygen leakage through the unsealed places in amounts shown under clause 8, section II. In this case, the pressure in the respirator on membrane 1 can not overcome the stress acting from the surplus pressure mechanism 22. The membrane 1 undergoing the effect of the surplus pressure mechanism 22 aneroid continues pressing on lever 2 which keeps the breathing automatic device valve 7 in opened state.

Therefore, due to the surplus pressure, there is no possible suction of air from the atmosphere during inhalation through the places where the mask does not fit closely and the event of oxygen hunger is excluded.

When the mask is not hermetically adjusted to the face the indicator flaps are fully opened or are but partially closed during exhalation.

If the airman is poorly or the respirator is not in [illegible], before finding out the reason of the [illegible] cut in the oxygen supply with the help of the emergency valve of the P-28 reducer. In this case oxygen will [illegible] flow from the L.P. chamber of the reducer, [illegible] the ejector nozzle 8, into the respirator body.

While oxygen is being supplied by the reducer emergency

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valve the oxygen indicator flags are all the time kept in open position.

When the pressure rises up to 2.5 or 3.5 kg/cm^2 before the ejector nozzle, to prevent the indicator from breakdown the ejector 8 starts operating as a safety valve. At this, under the oxygen pressure upon the ejector nozzle end face, the nozzle in pressing spring 23 clears the saddle and allows for the oxygen to flow through the side openings straight way into the respirator body. When the pressure before the ejector nozzle 8 drops the spring 23 returns the nozzle into the former position and oxygen enters the respirator through the central openings in the nozzle.

Position of the air suction switch handle alters the operation of the respirator only in relation to the air suction from the atmosphere. When the air suction switch is closed pure oxygen is supplied for inhalation. At opened air suction switch for inhalation there is supplied a gas mixture consisting of the oxygen flowing from the bottle, and of the air sucked through the air suction automatic device, the amount of this depending upon the flight altitude.

E. Operation of the Respirator at Altitudes Ranging from 11 - 13 and up to 15 km

At the altitude of 11 - 13 km aneroid 24 /Fig.5/, in lever on pusher 25, moves away valve 26 from the saddle [redacted] Oxygen enters the respirator through the opening E.

The amount of oxygen supplied to the respirator depend-

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on nozzle K and varies within the range of 15 to 20 l/min. In doing so, the pressure of oxygen generated in the respirator acts on membranes 1, which move apart together with levers 2, discontinuing the action of the levers on rod 5. At this time spring 18 presses the valve 7 to saddle A, cutting of oxygen access to channels B and B, i.e. the breathing automatic device with the ejector is cut off and the flags of the oxygen indicator will be closed. Oxygen from the respirator body space passes to the KM 10 hose, the goffered hose, and to the mask. At this, oxygen through opening K reaches the space K of the mask surplus pressure regulator. The K space is connected by means of rubber pipes to the under diaphragm space of the exhalation valve 21 and to the tension compensator 27. Due to the continuous flow of oxygen in the hose, mask, the space K as well as in the underdiaphragm space of the exhalation valve 21 and in the compensator 27 there is created an oxygen surplus pressure. The value of this pressure is automatically controlled in harmony with the altitudes with the help of the surplus pressure regulator.

At inhalation, the surplus pressure in the mask is momentarily lowered, whereas at exhalation it rises.

V. INSTALLATION OF THE KM-28 RESPIRATOR UNIT IN THE AIRCRAFT AND ITS CHECKING BEFORE AND AFTER INSTALLATION

1. Checking of the KM-28 Respirator Unit Before Installation

Before installing the KM-28 respirator in the aircraft check the following:

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1. KM-28 Respirator

a/ Airtightness of H.P. and L.P. Spaces.

b/ Additional oxygen supply by the respirator by altitudes with the mask down.

c/ Altitude at which continuous oxygen supply is cut in and out.

d/ Percentage of oxygen in the supplied gas mixture.

2. KP - 28 Reducer

a/ Airtightness of H.P. and L.P. spaces.

b/ Installed /static/ pressure and pressure at operation.

3. KM - 18H Mask

a/ Airtightness of inhalation and exhalation valves.

b/ Airtightness of connection between tension compensator lock and mask.

c/ Airtightness of mask tension compensator.

d/ Value of surplus pressure created by the regulator by altitudes.

The KM - 18H oxygen mask is an outfit for personal [illegible] and is to be fitted beforehand to the face and held [illegible] by each member of the crew. The masks are delivered in three sizes: small-sized, medium sized, and large-sized ones.

The airman should adjust his mask by trying it on and fitting it to the face in such a way that the upper part of the mask be placed on the bridge of the nose not higher than the eyes level. If the mask does not fit close to the nose portion it is necessary to bend down the rubberized clamp.

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To determine the place of arrangement of the tension compensator on the helmetphone put on the mask fastened to the tension compensator, and guide /in parallel/ the side strings over and below the earphone projections.

Having determined the position of the tension compensator the airman should sew to the helmetphone the buttons supplied with the set and used for fastening the tension compensator to the helmetphone.

The next step is to sew to the helmetphone the leath. collars intended for keeping the upper side strings from sliding downward. The leather collars are included in the delivery.

In order to determine the places where the leather collars are to be sewn on put on the helmetphone with the tension compensator.

Button the mask fastenings to the tension compensator. Adjust the strings to make the mask fit closely. Straighten the side strings to allow them to get on the earphone projection. Place the collars under the upper strings over the earphones, fasten them with the buttons, pull the strings upward or down or to one side so that the upper string does not obscure the observation, and mark the place where the leather collar is to be sewn on. The collar end /with the button base/ have to be sewn on the helmet-phone, the other end with the buttonhole leave loose. The collars should be sewn symmetrically on both sides of the helmet-phone.

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B. Installation of the KM-28 Oxygen Respirator Unit

Installation of the KM-28 oxygen respirator is to be performed in compliance with the installation diagram for the given type of aircraft.

The KM-28 respirator is to be installed in the aircraft in such a way to provide for the following.

1. The respirator membranes and the air suction automatic device must be in vertical position. Allowable deviation for the membranes not to exceed 30°, for the automatic device not more than 90°.

2. The MK-18 oxygen indicator should be within the airman's eyeshot.

3. The KM-28 respirator and the KP-28 reducer should be installed in the aircraft so as to provide for convenient access to the air suction switch handle, the emergency valve of oxygen supply; and the hand-wheel of the surplus pressure valve regulator.

H.P. piping from the KP - 28 reducer is to be connected to the oxygen indicator nozzle marked with the letter K. The piping from the KP-28 reducer is to be connected to the KM-28 respirator inlet nozzle, having an exterior thread.

Pipings from the reducer cross head are to be connected in the following way: one /any of the two/ --to the oxygen indicator nozzle marked with the letter K, the other piping reducer crosshead --to the respirator.

At installation avoid excessive bends of the pipings.

It is absolutely forbidden to lubricate the KM-28 respirator details with oil /grease/, as oil in combination with oxygen produces an explosive mixture.

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After checking the [illegible] for airtightness with the [illegible] through the reducer. [illegible] between the [illegible] valve and the reducer.

6. Checking of the Respirator.

Operation After Installation in the Aircraft.

After installation of the KP-28 respirator in the craft check the following:

1. Airtightness of the BP respirator system from the respirator valve and up to the breathing automatic device valve as this is stipulated under § 2 of section VIB. "Preparation of KP-28 Respirator Unit Items after Flight".

2. Resistance of respirator to inhalation.

3. Airtightness of the respirator L.P. space at vacuum.

4. Airtightness of KP-28 respirator L.P. space at [illegible] pressure.

5. Airtightness of the breathing automatic device

6. [illegible] /static/ pressure of the KP-28 regulator at consumption.

7. [illegible] of oxygen supply through the reducer [illegible].

8. [illegible] of continuous oxygen supply.

9. [illegible], created by the [illegible].

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VI. OPERATION OF THE KI-23 RESPIRATOR UNIT

A. Preparation of the KI-23 Respirator Unit for Flight

1. Carry an external inspection of all items of the Unit and make sure that they do not evidence any defects, moisture, and or dust and that they are properly fixed to the aircraft.

2. Check the oxygen supply through the reducer emergency valve. For this, open the respirator valve and the emergency supply valve of the reducer by turning the hand wheel to the left to the rest. At this, oxygen should come out of the respirator in a continuous flow and the oxygen indicator flags be fully opened.

Note: It is forbidden to close the oxygen discharge from the respirator when examining the oxygen supply through the nozzle of the reducer emergency valve as this may cause rupture of the respirator membranes.

3. Examine airtightness of the mask exhalation valve. To this end unseal one of the inhalation valves and put a rolled up piece of papem under it. Overlap the regulator inlet opening by your hand, or insert a plug, and close with ... over a side opening in the regulator body. Now slip ... mask to fit closely and breathe deeply out. If there is no exhalation, the exhalation valve of the mask is air-tight.

4. Adjust the mask bracing to the helmet and make sure that the mask hermetically fits both at vacuum and at surplus pressure.

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To examine airtight fitting of the mask at vacuum have the goffered hose of the mask clamped with the hand above the surplus pressure regulator and breathin. If no inhalation is yielded than the mask is well adjusted. When checking airtightness of the mask adjustment at surplus pressure connect the mask to the KM-10 hose and close with your finger the opening in the mask surplus pressure regulator body and turn the hand wheel of the respirator surplus pressure regulator to the left up to the rest. If there is no leakage of oxygen around the places of mask and face fiting then the mask adjustment in a good one.

5. Examine operation of the respirator unit items. For this, by opening the respirator valve, cut in the oxygen supply, put on the mask, connect it to the KM-10 hose, and make several normal and deep inhalations, with the air suction automatic device in opened and closed positions. The oxygen indicator flags must fully close at each inhalation and open - at the exhalation.

3. Preparation of the KM-28 Respirator Unit Items After Flight

1. Carry on external examination of all respirator items, and make sure that no defects and/or moisture be evidenced. Check whether they are thoroughly to the aircraft.

, examine airtightness of the respirator A.P. system with the respirator valve and up to the breathing automatic device valve. To this end open the respirator valve and close it at once. Follow the pressure gauge pointer

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on the KK-18 oxygen indicator pressure gauge. If the pressure gauge pointer does not move during 1 or 2 min. then the system is airtight.

3. Check the L.P. system for airtightness beginning with the breathing automatic device valve and up to the oxygen mask inclusively. For doing so the air suction automatic device switch and the respirator valve should be [illegible] and the pressure gauge pointer of the oxygen indicator should be set at zero. After this put on the previously adjusted mask and try to draw a breath. If inhalation is not possible then the system is airtight.

4. Inspect the oxygen supply through the reducer emergency valve nozzle by the method stated under § 2 of Section VI A "Preparation of KI-22 Respirator for Flights.

5. Examine the operation of the KI-28 respirator breathing valve using the method depicted in § 3 of Section VI A "Preparation of KI-28 Respirator Unit for Flight".

6. Close the respirator valve, discharge the oxygen from the system, and close the oxygen hose with a rubber plug /the plug should be provided with an opening/.

7. Wash the oxygen mask with rectified spirit and thoroughly dry it out.

3. Usage of the KI-28 Respirator Unit in Flight

Duration in the oxygen supply for the aircraft personnel will be determined by the flying conditions.

1. During the flight watch the respirator operation and periodically check the oxygen amount by the oxygen indicator pressure gauge.

2. In cases when the respirator fails to operate properly or the airman is poorly it is necessary to cut in the

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oxygen supply through the reducer emergency valve nozzle. On doing so the oxygen supply will be continuous and will comprise 8 to 12 l/min. The indicator flags will open. When the oxygen supply is through the reducer emergency valve nozzle the oxygen amount will diminish more rapidly. Therefore, it is necessary to follow the pressure gauge readings.

3. Continuous supply of oxygen is to be cut in at altitudes of 11 - 13 km and comprises 15 - 20 l/min. After continuous oxygen supply has been cut in the indicator discontinue operating and will be fully closed.

VII. ROUTINE CHECKING

This should be carried out after taking all the required safety measures.

After every 2525 hours' flight checking of the PT-28 respirator unit equipment is to be performed as per requirements indicated in Section VII4 of the "Preparation of the PT-28 Respirator Unit equipment after Flights". After 50th flight hours perform all steps stipulated above for a 2,[illegible] hour's flight.

In addition examine and check the following:

. Respirator resistance to inhalation.

. Airtightness of the L.P. space of the respirator [illegible] surplus pressure.

. Airtightness of the respirator breathing automatic valve VA-90.

. Value of continuous oxygen supply by the respirator.

. Pressure created by the hand regulator of the respirator.

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6. Airtightness of the mask inhalation valves.

7. Airtightness of the mask exhalation valve.

8. Airtightness of the mask tension compensator.

9. Airtightness of the KAS-14 board accessories check valves.

After 100±5 flying hours carry on the 50 hour's checking, and examine and check also the following:

1. Pressure of opening of the breathing automatic device valve.

2. Value of additional oxygen supply by altitudes and value of surplus pressure at a height of 10 km.

3. Oxygen content in the gas mixture supplied by the respirator.

4. Altitudes at which the continuous oxygen supply is cut in and out.

5. Installed /Static/ pressure of the reducer and pressure at consumption as well as value of oxygen supply through the reducer emergency valve nozzle.

6. Value of pressure for full opening of indicator flags.

7. Main error of the KK-18 oxygen indicator pressure gauge by comparison of the pressure gauge readings with a control pressure gauge.

. Airtightness of the mask regulator valve at the of 15 km.

. Value of surplus pressure created by the surplus regulator.

10. Resistance of the mask exhalation valve under ground conditions.

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VIII. POSSIBLE FAILURES OF THE KM-28 RESPIRATOR EQUIPMENT AND THEIR ELIMINATION

It is forbidden to carry out in field conditions any repairs with the type KM-28 respirator unit, connected with its dismounting and adjusting.

Items of the unit requiring such kind of repairs should be replaced by new ones or those being in good working conditions and the faulty ones should be sent to repair shop.

A. Failures of the KM-28 Respirator

Breathing automatic device valve is not airtight. Put on the mask and draw several deep breaths from the respirator. If air leakage has not got eliminated the respirator should be replaced against a new one.

B. Failures of the MK-18 Oxygen Indicator

1. Cracks in the MK-18 oxygen indicator body.

2. Broken glass.

3. The indicator flags do not close at cutting out of oxygen supply.

4. The pressure gauge pointer at pressure drop does not return to zero position.

If there is but one of above defects evidenced the indicator should be replaced.

C. KM-18H Mask Failures

1. The exhalation valve is not airtight /the valve is contaminated or damaged/. If the exhalation valve is contaminated pour some water over the valve and make several short-like exhalations.

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2. Suede obturator of the mask is contaminated. Wash the obturator with warm water and dry it out.

3. Connections of the tension compensator lock with the mask is not airtight. /Shim in the butt joint lock has got lost/. Replace the shim.

4. If the mask body, or the goffered hose, or the tension compensator has got damaged and does not ensure airtightness or the exhalation valve is not airtight the mask should be replaced.

5. Surplus pressure regulator valve is not airtight, is accompanied by surplus pressure drop in the mask. The regulator should be replaced. /No partial replacement is permissible/.

D. KM-10 Hose Failures

1. The hose has inconsiderable dents. Deformation should be eliminated by straightening.

2. There are cuts, cracks, and/or other damages in the hose surface rubber. The hose should be replaced.

E. Failures of the H.P. System

If at examination of the H.P. system airtightness reacings of the pressure gauge drop it means that the system is not airtight, i.e. there is oxygen leakage into the atmosphere. Find out the place of oxygen leakage by covering place of connection with soap foam, and remove the defect. Keep in mind that oxygen pressure in the H.P. system may drop also if the breathing automatic device valve is not airtight. The respirator with such a valve cannot be used any longer and must be replaced.

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F. Failures of the KP-28 Reducer

1. Air leakage from under the reducer cover.

2. Air leakage from under the reducer muffler.

3. Insufficient oxygen supply through the reducer emergency valve nozzle.

If there is but one of the above defects evidenced the reducer should be replaced.

G. Failures of the Pipings

If the piping evidences either cracks or a rough face it should be replaced.

H. Failures of the Aircraft and Respirator Valv.

1. The valve flap is not airtight.

It must be replaced.

2. The membranes are not airtight.

There is leakage of oxygen from under the plug at closed position of the valve. Screw in the plug.

I. Failure in Assemblies of the KAB-14 Oxygen Board Accessories with Check Valves

1. Check Valve is not airtight due to the valve seat being worn or because of foreign matter present on the valve saddle.

To remove the above defect take apart the KAB-14 wipe the valve and saddle with a clean rag slightly moistened with pure benzine /free of oil admixtures/ until the latter is fully removed. Then wash all the metallic parts of the assembly in pure benzine /with no oil admixtures/ and blow through with pure oxygen. After this,

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reassemble the unit and examine it for airtightness of the check valve.

If the valve airtightness is not achieved the valve or the valve with saddle should be replaced and the examination of the assembly for airtightness repeated.

IX. OXYGEN RESERVE CALCULATION

When using a type KM-28 oxygen respirator the oxygen consumption widely varies subject to following factors: flight altitude, ambient air temperature, personal features of the airman using the respirator, work performed by the man, etc. Strict calculation of the oxygen reserve taking into account all the above mentioned factors is a difficult task. Therefore, average oxygen consumption per time of the respirator usage at all altitudes up to 11-13 km for the type KM-28 respirator is accepted equal to 5.5 l/min /reduced to the temperature of +15°C and the pressure of 760 mm Hg/, per capitum, for altitudes exceeding 11-13 km --15-20 l/min.

Example: The bottle of 8 litres capacity is filled with oxygen to the pressure of 155 kg/cm² at a temperature of +20°C.

The time during which oxygen may be used will be determined in the following way. Multiply the bottle capacity by the bottle inner pressure /reduced to the temperature of +15°C/ and thus the so-called non-accountable oxygen reserve equal to 30 kg/cm², and divide the product by the average oxygen consumption rate of 5.5 l/min. In our case the pressure of 155 kg/cm² at the temperature of +20°C after reducing to the

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temperature of +15°C will be equal to 150 kg/cm².

Flight duration in minutes with the use of the oxygen respirator will be:

$$\frac{8/150-30/}{5.5} \approx 174 \text{ min. or 2 hours 54 min}$$

After cutting in the continuous oxygen supply its reserve will diminish at a quicker rate, therefore it will be necessary in such cases to follow the pressure gauge readings.

Any person using a type KI-28 respirator should be well acquainted with the norms of oxygen consumption in dependence with the given conditions of operation, which may be easily determined by experience.

X. GUARANTEE

The works guarantees efficient operation of the type KI-28 oxygen respirator within 150 flight hours during two years, these comprising one year of operation in the air- and one year used for transportation and storage in

[illegible] conditions should comply with instruction
[illegible] the storage and conservation of oxygen
[illegible] and oxygen equipment.

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Fig.1

1. KM-38 oxygen respirator; 2 - KM-18H mask; 3 - KP-28 reducer; 4 - KM-10 hose; 5 - MK-18 oxygen indicator; 6 - respirator valve; 7 - aircraft valve; 8 - charging nozzle; 9 - bottle; 10 - crosshead; 11 - bottle tee; 12 - Tee; 13 - Respirator tee.

Fig.2

Fig.3

1. KM-38 oxygen respirator; II - KM-18H mask; III - KP-28 reducer; IV - KM-10 hose; V - MK-18 oxygen indicator; VI - respirator valve; VII - Aircraft valve; VIII - Aircraft nozzle; IX - Tee with check valves; X - Bottle tee; XI - Surplus pressure regulator.

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